

**Remarks**

Claims 84 and 86-93 are pending in the Application.

Claims 84, 86-88, and 90-93 stand rejected.

Claim 89 is objected to.

Claims 84 and 91-93 are cancelled herein with prejudice.

Claims 94 and 95 are added herein.

**I. REJECTIONS UNDER 35 U.S.C. § 102**

Examiner has rejected Claims 84, 87-88 and 91-93 under 35 U.S.C. § 102(a) as being anticipated by Kiang *et al.*, “Carbon Nanotubes with Single-Layer Walls,” Carbon, 33(7), pp. 903-914, 1995 (“Kiang”). Office Action at 3-5. When doing so, the Examiner has relied upon Dresselhaus *et al.*, Carbon Nanotubes: Synthesis, Structure, Properties, and Applications (“Dresselhaus”)<sup>1</sup> to show a “state of fact.”<sup>2</sup> *Id.*

Regarding Claims 87, Examiner contends that “no difference is seen between the bundles of single-walled nanotubes of Kiang *et al.* and the ‘cable-like’ fibers formed from carbon fibers, each of which comprises single-walled nanotubes in a parallel orientation.” Office Action, at 4. Applicant respectfully points out that cable-like fibers are described in the present Application (page 46, lines 15-20, and Fig. 12) as being a type of composite comprising continuous carbon fibers, which themselves comprise single-wall carbon

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<sup>1</sup> Dresselhaus was published in 2001. The present application is a division of co-pending prior application Serial No. 10/000,746, filed on November 30, 2001, which is a continuation of prior application Serial No. 09/242,040 filed on September 13, 1999, which is the 35 U.S.C. § 371 national application of International Application Number PCT/US97/13896 filed on August 8, 1997, which designated the United States, claiming priority to provisional U.S. patent application Serial Number 60/023,732 filed on August 8, 1996. Thus, putting aside the benefits this application receives due to its provisional application, this application has at least an effective filing date of August 8, 1997. Accordingly, Dresselhaus is not prior art.

<sup>2</sup> As discussed in footnote 1, Dresselhaus is not prior art for the present Application. Furthermore, there are only three instances under which a second reference can be used when making a §102 rejection. See M.P.E.P. § 2131.01. The only one possible pertinent here is the third instance, namely to “[s]how that a characteristic not disclosed in the reference is inherent.” *Id.*

nanotubes. This is precisely the limitation expressed in the Claim 87 and its dependent Claim 88. The claims require that “each of the continuous carbon fibers comprise single-wall carbon nanotubes in substantially parallel orientation” and these continuous carbon fibers comprise the claimed composite fiber. *Kiang* merely teaches bundles of single-wall carbon nanotubes—not composite structures.

The Examiner appears to suggest that the bundles of *Kiang* somehow intertwine to form ropes by asserting this is inherently disclosed by reliance on *Dresselhaus*. As an initial matter, Applicants point out that there is some confusion caused by *Dresselhaus* because it defines bundles and ropes differently than in the present Application. Applicant have defined a rope as a particular bundle of carbon nanotubes (i.e., “The single-wall carbon nanotubes may be aggregated in “ropes” or bundles of essentially parallel nanotubes”). Application, at 27, *ll.* 9-10. *Dresselhaus* does not use this same nomenclature; rather, it utilizes the term “rope” as a collection of intertwined bundles aligned along a common axis. *Dresselhaus*, at 6. For the purpose of clarification, Applicants will continue to use their own nomenclature and refer to these intertwined bundles as just that--intertwined bundles.

That said, *Kiang* does not expressly disclose intertwined bundles. The Examiner appears to concede this because of his reliance upon *Dresselhaus* as a “state of fact.” In short, the Examiner is asserting that *Kiang* inherently discloses intertwined bundles because of its disclosure of bundles. Applicants traverse this speculation by Examiner.

For inherency to be shown, extrinsic evidence must be presented that makes “clear that the missing descriptive matter is *necessarily* present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.” *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268, 20 U.S.P.Q.2d 1746, 1749 (Fed. Cir. 1991) (emphasis added). Inherency cannot be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is legally insufficient. *Id.*, 948 F.2d at 1269, 20 U.S.P.Q.2d at 1749.

*Dresselhaus* supports this intertwined bundle by reference to a reference [26], which is a 1999 reference, which, like *Dresselhaus*, is not prior art to the present Application.

Thus, *Dresselhaus* is not suggesting in any manner that such intertwined bundles were present in the prior art of the Application. Moreover, in the specification of the Application, Applicants have identified U.S. Ser. No. 08/687,665, entitled "Ropes of Single-Walled Carbon Nanotubes," which application has now issued as U.S. Patent No. 6,183,714 ("the '714 patent"). The invention disclosed in this patent was also disclosed in Thess *et al.*, "Crystalline Ropes of Metallic Carbon Nanotubes," *Science*, Volume 273 (July 26, 1996), pp. 483-487 ("*Thess*"). Both *Thess* and the '714 patent show ropes (bundles of aligned single-wall carbon nanotubes) that are not intertwined. Thus, it does not follow that bundles or ropes will necessarily intertwine to form an intertwined bundle. To the contrary, it is precisely Applicants' position that they invented a fiber that is a composite fiber comprising a plurality of continuous carbon fibers wherein each of the continuous carbon fibers comprise single-wall carbon nanotubes in substantially parallel orientation.

As the *Thess* and the '714 patent show that bundles or ropes do not necessarily intertwine, it follows that *Kiang* does not inherently have the elements are suggested by Examiner. Stated otherwise, Applicant has satisfied its burden by presenting evidence (here *Thess* and the '714 patent) negating the claim of inherency.

Regarding Claim 88, these claims depend on Claim 87 and are not anticipated for the same reason noted above for Claim 87.

Regarding Claims 84 and 91-93, these claims have been cancelled without prejudice.

As a result of the foregoing, Applicant respectfully requests that the Examiner withdraw rejection of Claims 87-88 under 35 U.S.C. § 102(a) as being anticipated by *Kiang*.

## **II. REJECTIONS UNDER 35 U.S.C. §102/§103**

Examiner has rejected Claims 84, 86-88 and 90-93 under 35 U.S.C. § 102(a) under 35 as anticipated by or, in the alternative, under U.S.C. § 103(a) as being obvious over *Kiang* with *Dresselhaus* to show a state of fact. Office Action at 4.

As an initial matter, the Examiner has stated the following in the Office Action:

[A]pplicant is directed to the difference between an inherency argument and a proper 102/103 rejection, the latter of which may properly be made in such

instance where the examiner cannot determine whether the product of the reference contains these claimed properties, yet has reasonable expectation that this be the case.

Office Action, at 2. This is an inaccurate statement of the law.

As reflected in M.P.E.P. § 2112, a 102/103 rejection is nothing more than alternative rejections under § 102 and under § 103. The Courts recognize there is nothing inconsistent with this type of alternative rejections. See M.P.E.P. § 2112; *In re Best*, F.2d 1252, 1255 n.4, 195 U.S.P.Q. 430, 433 n.4 (C.C.P.A. 1977). However, while the Examiner can assert these alternative rejections, the determination as to whether these rejections are proper is based on individual § 102 and § 103 analysis. M.P.E.P. § 2112. Thus, contrary to what the Examiner appears to suggest, the Examiner's burdens under a 102/103 rejection are the same as any other rejections under § 102 and under § 103.

And, as the Examiner has relied upon *Dresselhaus*, a non-prior art reference, to show a "state of fact," this means the Examiner is relying on supposed inherent disclosure in *Kiang* to support his rejections. Again, this test of inherency must be determined as any other rejections under § 102 and § 103. M.P.E.P. § 2112.

**A. Rejections Under § 102**

As to Claims 87-88, these rejections are exactly the same as the rejections discussed above in Section I. Thus, for the same reasons, these claims are not anticipated by *Kiang*.

As to Claim 90, this claim depends from Claim 87; thus it has all of the elements of Claim 87 plus the additional elements recited in Claim 90. Accordingly, for the same reasons as for Claim 87, this claim is not anticipated by *Kiang*.

As to Claim 86, which Applicant has now redrafted in independent form, the Examiner does not assert in the Office Action that *Kiang* expressly discloses the element of Claim 86 requiring that a "substantial portion of the single-wall carbon nanotubes have a homogeneous characteristic selected from the group consisting of lengths, diameters, helicities and combinations thereof." The Examiner also admits that *Kiang* expressly does not recite elements (a) and (b) of Claim 86 when he stated "it is not explicitly taught that the individual single-wall carbon nanotubes in a bundle have homogeneous lengths or helicities

in any given region of the bundle. Office Action, at 5. Rather, to bridge these gaps, Examiner relies upon *Dresselhaus* to suggest that the lacking elements are inherent characteristics of the carbon nanotubes of *Kiang*. Office Action, at 3-4 & 5. Applicants traverse these inherency speculations by Examiner. There is nothing to indicate that *Kiang necessarily* has these elements, thus such properties are not inherent.

Examiner contends “Dresselhaus et al. teaches that the bundles produced by the vaporization and the arc-discharge processes contain nearly perfect single-wall nanotubes of substantially uniform diameter (page 73). Therefore, it is inherent that the bundled single-walled nanotubes of Kiang et al. have a substantially uniform diameter. “ Office Action, at 3. Again, for inherency to be shown, extrinsic evidence must be presented that makes “clear that the missing descriptive matter is *necessarily* present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.” *Continental Can.*, 948 F.2d at 1268, 20 U.S.P.Q.2d at 1749 (emphasis added). Inherency cannot be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is legally insufficient. *Id.*, 948 F.2d at 1269, 20 U.S.P.Q.2d at 1749.

*Dresselhaus* itself refutes Examiner’s conjecture that a substantial portion of the single-wall carbon nanotubes disclosed in *Kiang* (made utilizing an arc discharge method) would necessarily have a uniform diameter. *Dresselhaus* specifically identifies that Dr. Richard Smalley (an inventor of the present Application) and his co-workers at Rice University (the assignee of the present Application) made a major breakthrough by successfully synthesizing carbon nanotubes with substantially uniform diameter. *Dresselhaus*, at 3. *Dresselhaus* identifies the invention of Dr. Smalley *et al.* disclosed in *Thess*, which invention again is claimed the ‘714 patent, which is commonly owned by the assignee of the present Application. As *Kiang* was published before *Thess*, *Dresselhaus* cannot be interpreted to mean that *Kiang* necessarily had such a homogeneous characteristic, as *Dresselhaus* itself recognizes *Thess* as the first instance showing nanotubes having these characteristics. Therefore, *Dresselhaus*, the publication Examiner relies upon to show inherency, refutes the very thing the Examiner is using it to prove.

This is further confirmed on page 73, wherein *Dresselhaus* notes that certain methods had been discovered, including an arc discharge method, in which nearly perfect single-wall carbon nanotubes of uniform diameter were produced in high yield. *Dresselhaus*, at 73, reference [6]. However, the publication of reference [6] is not prior art to the present application. And while reference [6] is for an arc discharge method, this reference cannot be viewed as stating that all arc discharge methods utilized to produce single-wall carbon nanotubes necessarily produce a substantial portion of carbon nanotubes having the homogenous characteristic regarding their diameters. Thus, again, Examiner's contentions respecting inherency are further inappropriate.

Moreover, regarding the argument that single-wall carbon nanotubes have inherently homogeneous diameters when aggregated in bundles is similarly incorrect. In the materials provided to the Examiner in Applicant's prior Amendment Under 37 C.F.R. § 1.111, filed December 29, 2003, Applicant presented a report showing ropes of single-wall carbon nanotubes in which the nanotubes within the rope have diameters that vary widely. *See Nikolaev et al.*, "Diameter doubling of single-wall nanotubes," *Chemical Physics Letters*, 266 (5-6), pp. 422-426, 1997, Fig. 2 (attached as Exhibit A to the December 29, 2003 1.111 Amendment ). Thus, again, the assertion the contention that *Kiang* necessary must have produced a substantial portion of carbon nanotubes having the claimed homogeneity characteristic of Claims 86 is without basis.

Applicants further note that *Thess* (and the '714 patent) do not disclose all of the elements of the continuous fiber as claimed in Claim 86. For instance, it lacks the combination of elements (a) and (b) of that claim.

Accordingly, Claim 86 is also not anticipated by *Kiang*.

Regarding new Claims 94-95, these claims depend on amended Claim 86 and are not anticipated for the same reason noted above for Claim 86.

Regarding Claims 84 and 91-93, again, these claims have been cancelled without prejudice.

As a result of the foregoing, Applicant respectfully requests that the Examiner withdraw rejection of Claims 86-88 and 90 under 35 U.S.C. § 102(a) as being anticipated by *Kiang*.

**B. Rejections Under § 103**

As to the alternative § 103(a) rejection, the Examiner is reminded that:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure.

*See* M.P.E.P. 706.02(j); *see also In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

As noted above, each of Claims 86-88 and 90 contains features not disclosed, taught, or suggested in *Kiang* (including inherently). Accordingly, the prior art reference upon which Examiner relies does not disclose all of the claim limitations. Therefore, Examiner has not presented a *prima facie* case of obviousness for any of rejected Claims 86-88 and 90.

Furthermore, regarding Claims 84 and 91-93, again these claims have been cancelled without prejudice.

As a result of the foregoing, Applicant respectfully requests that the Examiner withdraw the rejection of Claims 86-88 and 90 under 35 U.S.C. § 103(a) as being obvious over *Kiang*.

**IV. OBJECTIONS**

Examiner has objected to Claim 89 as being dependent upon a rejected base claim (Claim 87). Applicant has now rewritten Claim 89 in independent form to include all limitations of the claims to which it depends (*i.e.*, the limitations of Claim 87).

**V. AMENDMENTS TO THE DRAWINGS**

United States Patent Application Serial No. 10/027,568, filed December 21, 2001 (“the ‘568 Patent Application”) is a divisional of the present Application, which applications are commonly assigned. On October 7, 2002, a Notice of Allowance was transmitted to Applicant; and Applicant paid the issue fee on October 16, 2002. Subsequently, on March 20, 2003, Applicant received a Notice Regarding Drawings for the ‘568 Patent Application. Specifically, the Draftperson’s review objected to the drawings for Figures 2A-C, 4A-D, 6, and 7A-B for the following reasons set forth on PTO Form 948, which was attached to the Notice Regarding Drawings for the ‘568 Patent Application. These were:

(a) Under 37 C.F.R. § 1.84(i), for Figures 2A-C, 4A-D, 6, and 7A-B, “[l]ines, numbers & letters not uniformly thick and well defined, clean, durable, and black (poor line quality).”

(b) Under 37 C.F.R. § 1.84(m), for Figures 2A-C, 4A-D, 6, and 7A-B, “[s]olid black shading not permitted.”

(c) 37 C.F.R. § 1.84(p), for Figures 4A-D, 6, and 7A-B, “[n]umbers and reference characters not plain and legible.”

On May 19, 2003, Applicant filed a Response to Notice Regarding Drawings in the ‘568 Patent Application. In this response, Applicant replaced new drawing sheets 3/14, 6/14, 8/14, 9/14 and 10/14 for the original sheets. These sheets include more legible Figures 2A-2C, 4A-4D and 6 – 7B as requested by the Draftperson in the Notice Regarding Drawings for the ‘568 Patent Application.

As the present Application contains these same drawings, Applicant is submitting these improved figures in the present Application. Pursuant to 37 C.F.R. 1.84(b), the improved figures are submitted as photographs, as this is the only practicable medium for illustrating these figures.

Applicant has amended the drawings to facilitate prosecution of the present Application; Applicant believes by doing so, this will obviate this potential issue with the figures.



**VI. AMENDMENTS TO THE SPECIFICATION**

After Applicant filed a Response to Notice Regarding Drawings in the '568 Patent Application, Applicant received a Notice of Drawing Inconsistency with Specification in the '568 Patent Application, dated June 2, 2003. In this Notice, Applicant was informed that the USPTO had received the improved figures (which presumably were accepted by the draftsperson) but the USPTO had now identified an inconsistency between the drawings and the Brief Description of Drawings in the '568 Patent Application. These were: The Brief Description referred to Figures 3A-3B and 5A-5B while the drawings contained Figures 3A-3C and 5A-5C. On June 30, 2003, Applicant filed an Amendment in Response to Notice of Drawing Inconsistency with Specification in the '568 Patent Application. In that amendment, Applicant amended the Brief Description of Drawings and the Detailed Description of the Invention, in the identical manner as presented on page 2 above.

Because this same issue exists in the present Application, Applicant is amending the specification in the same manner as done in the '568 Patent Application. Accordingly, in the specification, the paragraphs within the Brief Description of Drawings have been amended to correctly identify the drawings. In the Detailed Description of the Invention of the Specification, the amendment of the paragraph beginning at page 18, *l.* 11, was made to harmonize the written description and the drawings. No new matter is added by these amendments to the specification.

The Applicant believes by this amendment reconciles the inconsistency between the drawing and the Brief Description of the Drawing. Again, Applicant is amending the specification to facilitate prosecution of the present Application. Applicant believes by doing so, this will obviate this potential issue between the drawings and the specification.

**VII. CONCLUSION**


As a result of the foregoing, it is asserted by Applicant that the Claims in the Application are now in a condition for allowance, and respectfully request allowance of such Claims.

Applicant respectfully requests that the Examiner call Applicant's attorney at the below listed number if the Examiner believes that such a discussion would be helpful in resolving any remaining problems.

Respectfully submitted,

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